by placing the hives quite in the open, with the entrances facing south-east. They thus secure the earliest rays of light, and the bees are tempted to start work early.

Secondly, high winds cause great loss among the colonies, and it would be advisable when such prevail to keep the bees confined to the hives, unless there are sources for honey-gathering in the immediate vicinity. Unless the supers are on, the bees should on such occasions be fed artificially, so that the work of brood-rearing may not be hindered.

Thirdly, during a honey flow in the early part of the season weak colonies must have all the heat possible conserved by contraction of the brood-chamber and heavy top coverings, so that the largest number of foragers may be released.

Fourthly, as soon as the brood combs are well covered with bees, and the weather fine, the supers should be put on and covered up warmly. A day's delay at the crucial moment may ruin the prospects of a colony for the season, causing swarming and waste of time during the honey flow.

And, finally, the difference between the results secured by these two colonies shows that it is of very great importance that stocks go into winter quarters with abundance of stores, so that the earliest spell of fine weather may be utilised by the queen for pushing the breeding. The honey flow from the fruit and forest trees may be made a considerable source of revenue if colonies are got into strong condition in time to take full advantage of it.

HERBERT MACE.

THE VIVISECTION REPORT.

THE Royal Commission on Vivisection published, on February 12, its long-delayed report. Four years have elapsed since the Commissioners ceased to hear evidence: and we are left to guess at the causes of this delay. The report is already out of date: it says not a word about the work of Flexner, the work of Ehrlich, the work of Bruce, since 1908; it says nothing of the latest results of the preventive treatment against rabies and typhoid fever, nor of the latest diphtheria statistics from the hospitals of the Metropolitan Asylums Board.

Still, we can afford to forgive these defects: for the report, happily, is unanimous. There is no minority report. Two of the Commissioners died in the course of the inquiry; the remaining eight all sign the report. Three of them sign it subject to certain reservations, contained in memoranda; but these reservations leave untouched the main outlines of the report. The changes recommended by the Commission are of no profound importance to science, and are all of them within the province of the Home Office. There is none of them that requires the intervention of Parliament; and it is certain that Parliament has graver matters to think of than the exact estimate of experimental physiology and pathology.

The report is rather colourless: that is the price of unanimity. It deals with certain anti-vivisection statements politely, but there is a politeness which is not to be mistaken for approval. It reviews, quietly, what we all know already—the mighty deeds of the last thirty years, the development of Pasteur's principles, the work of Lister, the magnificent warfare against tropical diseases, and so forth. It devotes attention to the benefits gained by animals from experiments on animals; and to the public recognition of the value of such experiments. It recommends a slight increase of the Inspectorate, a further restriction of experiments under Certificate B, a special restriction of experiments involving the use of curare, that drug so much talked of and so seldom seen, and so forth. It contains some good passages: for instance:—

> "We desire to state that the harrowing descriptions and illustrations of operations inflicted on animals, which are fully circulated by post, advertisement, or otherwise, are in many cases calculated to mislead the public, so far as they suggest that the animals in question were not under an anæsthetic. To represent that animals subjected to experiments in this country are wantonly tortured would, in our opinion, be absolutely false."

And again, of certain anti-vivisection witnesses:—

> "After careful consideration of the above cases, we have come to the conclusion that the witnesses have either misapprehended or inaccurately described the facts of the experiments."

Thus, in spite of its colourless, dull style, the report is fairly satisfactory to men of science, and to the public. It comes at a time when the public is concerned with heavy national trouble and peril; and we believe that the public will be glad to leave the whole subject to the experts and to the Home Office.

NOTES.

IT is officially announced that the King has appointed Sir J. J. Thomson to the Order of Merit. Other men of science who are members of the Order are Lord Rayleigh, Dr. Alfred Russel Wallace, and Sir William Crookes.

WE understand that a portrait bust of the late Sir Joseph Hooker, from a sitting taken just before his death, has now been completed by Mr. Pennachine, the sculptor. A few visitors at Mr. Pennachine's studio, 68 Western Road, Ealing, W., consider it an excellent piece of work.

DR. CHARCOT has been awarded the gold medal of the Paris Geographical Society, in recognition of his work of exploration in south polar regions.

AT the anniversary meeting of the Royal Irish Academy on March 16, Prof. Jean Gaston Darboux and Prof. Elias Metchnikoff were elected honorary members of the academy in the section of science.

IT is announced that the twentieth "James Forrest" lecture will be delivered at the Institution of Civil Engineers on Friday, April 19, by Mr. H. R.

Arnulph Mallock, F.R.S., his subject being "Aërial Flight."

Dr. Ales Hrdlicka, curator of physical anthropology, United States National Museum, has been appointed as the representative of the Smithsonian Institution at the eighteenth International Congress of Americanists, which will meet in London on May 27 to June 1. He has also been designated by the State Department as a representative of the United States on this occasion.

The eleventh general meeting of the Association of Economic Biologists will be held at Dublin on March 28–29, under the presidency of Prof. G. H. Carpenter. Among the subjects of papers to be read and discussed are:—biological training for agricultural students; parthenogenesis; methods of testing grass seeds; the culture of *Phytophthora infestans* (the potato-blight fungus); the food of birds; the pollination of hardy plants; and cereal breeding.

We are informed that the collection obtained by Mr. Edmund Heller, who represented the Smithsonian Institution on Mr. Paul J. Rainey's African expedition, will rival that made by the Smithsonian African expedition in 1909 and 1910. In all there are about 700 large mammal skins in salt, 4000 small mammal skins, and a large number of birds and reptiles, most of them coming from regions not visited by the previous expedition, while some are from remote localities never before visited by naturalists.

From a report in *The Times* we learn that at a meeting of the Council of the Royal College of Surgeons on March 14, Sir Henry Morris, in the course of an eloquent tribute to Lord Lister, said:—"His gentle nature, his deep compassion, his courteous and dignified bearing, his imperturbable temper, his resolute will, his indifference to ridicule, his tolerance of hostile criticism combined to make him one of the noblest of men. His work will last for all time; its good results will continue throughout all ages; humanity will bless him for evermore; his fame will be immortal." The council unanimously decided that this tribute should be inscribed upon a tablet and placed in a suitable position within the walls of the college, "to serve as evidence to future generations of the honour, respect, and reverence in which the great founder of aseptic surgery was held by his contemporaries and immediate successors."

The experiments about to be undertaken by the Board of Agriculture and Fisheries in the breeding of horses on Mendelian lines will be watched with great interest. Impressed with the results of breeding on such lines in the case of the smaller domesticated animals, Captain Dealtry C. Part has given to the Board a large sum of money for carrying on similar experiments with horses. The direction of these experiments has been entrusted to Major C. C. Hurst, director of the Burbage Experiment Station, who will have the advice and assistance of Mr. F. W. Carter, superintending inspector of the Board of Agriculture. It has been decided that the best type of light horse for general purposes is the weight-carrying hunter, while the best foundation stock for crossing is the thoroughbred, and it is proposed to try to produce from the latter a distinct breed possessing the qualities of the former. The foundations for such a type already exist in weight-carrying steeplechasers, which have been found to breed true. Mares suitable for the purpose of the experiment have been selected, but there is some difficulty in regard to stallions; with those at present available, about one-half of the progeny is expected to be of the stamp required.

Reference has already been made in the public Press to the publication in the Government *Gazette* of a Bill by the Minister of Commerce of the Union of South Africa for the reform of the weights and measures of that Union. The Decimal Association has now received a copy of the Bill, and states that it represents a great advance towards the complete introduction of the metric system. The standard units of each table of weight and measure as shown in the second schedule of the Bill are those of the metric system alone, but the use of the imperial measures, with certain modifications, is permitted. The only Cape measures allowed are the rood of 12 Cape feet, their squares, and the morgen. The hundredweight is eliminated, and the cental of 100 lb. substituted; the ton is to be 2000 lb., and the carat is fixed at 205·304 mg. Section 12, subsection 3, provides that no person shall sell drugs and medicines retail by weight or measure except by measures of the metric system. It is not yet known whether the Bill has been introduced, but little, if any, opposition is expected to it, as the reform has been well discussed in the Union and the chambers of commerce have been consulted.

The following are among the subjects of lectures to be given at the Royal Institution after Easter:—Mr. F. Balfour Browne, "Insect Distribution, with Special Reference to the British Islands"; Prof. W. Bateson, "The Study of Genetics"; Prof. W. M. Flinders Petrie, "The Formation of the Alphabet"; Prof. A. W. Crossley, "Synthetic Ammonia and Nitric Acid from the Atmosphere"; Prof. J. Norman Collie, "Recent Explorations in the Canadian Rocky Mountains"; Prof. H. T. Barnes, "The Physical and Economic Aspects of Ice Formation in Canada" (the Tyndall lectures); Prof. J. H. Poynting, "The Pressure of Waves"; Mr. Willis L. Moore, chief of the U.S. Weather Bureau, "The Development and Utilities of Meteorological Science." The Friday evening meetings will be resumed on April 19, when Mr. Alan A. Campbell-Swinton will deliver a discourse on "Electricity Supply: Past, Present, and Future." Succeeding discourses will probably be given by Sir George H. Darwin, Mr. W. C. Dampier Whetham, Prof. W. Stirling, Mr. W. Duddell, Prof. Howard T. Barnes, Sir William Macewen, and other gentlemen.

We are glad to notice that efforts are being made to form an Indian Association for the Advancement of Science, the primary object of which is to afford a medium of communication between workers in different parts of India. It is proposed to hold an annual meeting (sectional or otherwise) in the more populous Indian towns where papers may be read and discussed, the proceedings to be published in the form of an annual report. Details are to be arranged at an early meeting in Calcutta. In a circular asking for cooperation and support for the proposal, Profs. P. S. MacMahon (Lucknow) and J. L. Simonsen (Madras) remark:—"We realise that the future of science in India depends upon the adequacy of the practical training which students receive in college laboratories, and, furthermore, that nothing is better calculated to increase its efficiency than the inculcation of research as the ultimate purpose of all scientific knowledge. It is unnecessary to point out how many and varied are the problems awaiting solution and how intimately the social and economic future of India is bound up with the successful application of scientific methods to all the activities, whether agrarian or industrial, of the community. We cordially invite the participation of Indian men of science, convinced in the belief that in such measure as it is accorded the objects of the society shall more nearly approach fulfilment and its usefulness and permanence be assured."

To *The Museums Journal* for March, Dr. Ernst Hartert communicates an illustrated account of the additions and alterations to Mr. Rothschild's museum at Tring.

Witherby's *British Birds* for March contains an account of the life and writings of Thomas Muffett, an English physician and ornithologist, who died in 1604, by Mr. W. H. Mullens, who originally contributed it to the publications of the Hastings and St. Leonards Natural History Society. Muffett's chief ornithological work, "Health's Improvement," which treats primarily of food, is ascribed to the year 1595, but is known by a posthumous edition published in 1655. The author was acquainted with more than one hundred kinds of British birds.

In his report for 1911, Captain Stanley Flower states that in October of that year the menagerie at Giza and the aquarium at Gezira contained 1761 specimens, representing 401 different forms of animals, this being the largest stock hitherto maintained at any one time. It is stated that the widely distributed tropical aquatic aroid plant, *Pistia stratiotes*, which had disappeared from Egypt for more than a century, has been rediscovered in the Delta by Prof. G. Schweinfurth. Specimens have been introduced into the Giza Gardens.

When the South American marsupial genus Cœnolestes was established in 1895 by Mr. O. Thomas it was referred to the diprotodont section of the order. In 1909 Miss P. H. Dederer pointed out that it showed so many polyprotodont resemblances as to preclude its reference to the former group, and it was accordingly made the type of a new suborder, Paucituberculata. Dr. R. Broom (Proc. Linn. Soc. N.S. Wales, vol. xxxvi., p. 315) disputes this view, and regards the diprotodont lower dentition (like the front teeth of the aye-aye) as of no taxonomic importance, and consequently includes the genus in the Polyprotodontia, regarding it as a specialised relative of the American opossums.

In the Transactions of the Bristol and Gloucestershire Archæological Society, vol. xxxiv., part i., for 1911, Mr. J. E. Pritchard announces the discovery in a Bristol excavation of the skull of an ancient type of horse. Prof. J. Cossar Ewart, on examination of the specimen, reports that it belongs to a small, slender-limbed horse or pony of the "plateau" type. Slender-limbed horses of an apparently similar class occurred as a wild species during Pliocene times in Italy and France, and others lived in Europe during the Neolithic, Bronze, and La Tene periods. Remains of similar horses have been found in Kent's Cavern, Torquay, and a nearly complete skeleton of this "plateau" type was found in the Roman fort of Newstead, near Melrose. An example of the same kind, unearthed by the Rev. Dr. Irving at Bishop's Stortford, was described by him at the last meeting of the British Association held at Portsmouth.

The Quarterly Journal of Microscopical Science for February (vol. lvii., part iii.) contains a useful account by Miss Freda Bage of the histological structure of the retina in the lateral eyes of Sphenodon (Hatteria). She finds that the retina agrees closely in structure with that of other reptiles, and that the sense cells consist of cones only, which may be either single cones or double cones. The structure of these cones is very complex, and is described in detail.

Three years ago considerable interest was aroused among students of reproduction problems by Dr. Guthrie's announcement that he had succeeded in transplanting ovaries from black to white hens, and *vice versâ*, with certain interesting effects on the offspring. The experiments have been repeated by C. B. Davenport, of the Carnegie Institution at Washington's station for experimental evolution, and published in *The Journal of Morphology* (vol. xxii., No. 1), but no evidence could be obtained that the engrafted ovary ever became functional. It was concluded that regeneration of the extirpated ovary took place, followed by the production of abundance of eggs.

From an announcement in *The Journal of the Board of Agriculture* (vol. xviii., No. 8) we learn that the Board has arranged for the continuation of the experiments carried on privately for many years by Mr. Elliot at Clifton-on-Bowmont. The soil is poor, very stony, and liable to deteriorate unless skilfully managed. Owing to its dryness, it suffers severely from drought; it can, in fact, by no ordinary system of farming be made profitable. Mr. Elliot's method was to plough up the herbage and to sow a new lot of plants capable of resisting drought; after many trials a mixture was devised suited to the conditions, and also bringing in profit. It contains cocksfoot, fescue, tall oat grass, and such drought-resisting plants as yarrow, kidney vetch, chicory, and burnet. After four or five years this mixture can be followed by arable crops. If the scheme proves profitable on further investigation, it will be of great value in agriculture.

AN interesting paper in *The Agricultural Journal of India* (part vi., vol. iv.) deals with the manufacture of palm sugar in Upper Burma. Both the male and the female trees are tapped for their juice from the time the first flowers appear until late in the year, *i.e.* about eight months. The juice is boiled down to a syrupy state, is then allowed to cool, and rolled into balls, which are exposed to the sun to dry. The methods, needless to say, are very wasteful, and necessitate a large consumption of wood for fuel, which for centuries has led to indiscriminate forest cutting. There is evidence to show that dense virgin forests stood in the past where only sun-burned arid areas now are, and unless the timber wasting is stopped serious results are bound to follow.

WE are in receipt of part ii. of Mr. J. H. Holland's "Useful Plants of Nigeria." Part i. was noticed in NATURE for December 30, 1909, where the scope of the work was described in detail, and the importance of the natural resources of that country was alluded to. The present part covers the natural orders from Connaraceæ to Araliaceæ, and includes, therefore, the order Leguminosæ. For variety of economic products this order can hardly be surpassed. Foodstuffs, timbers, dyes, drugs, gums, and resins are those which are of most importance to Nigeria. The work, which is published as "Additional Series IX." to *The Kew Bulletin*, is not only invaluable to those interested in Nigeria, but contains a wealth of information for all engaged in the study of economic products of this nature.

DR. G. PLATANIA contributes an interesting paper on the oscillations of the sea on the coasts of Sicily to the last number of the *Bollettino* of the Italian Seismological Society (vol. xv., pp. 223–72). These oscillations, which are known by the name of *marrobbio* in the district referred to, were made the subject of simultaneous observations at various places in Sicily during the months of April and May, 1905, and more recently at several stations, and especially at Mazzara on the western coast. The oscillations vary greatly in amplitude, sometimes exceeding the total range of the semi-diurnal tide. The periods are also very variable, those at Mazzara ranging about the values 10–18 and 21–26 minutes, the smaller average agreeing fairly with the period of oscillation in the open bay. The occurrence of the *marrobbio* seems to depend on the existence of a cyclonic distribution of atmospheric pressure in the neighbourhood of the Sicilian coasts.

IN *The Geographical Journal* for March, Prof. H. Bingham, the director of the Yale Peruvian Expedition, describes the results obtained. Careful topographical work was done in surveying a series of areas on large scales from 1 : 4500 to 1 : 3600, with the necessary contour lines. Lake Parinacochas was also surveyed, and the altitude of Mount Coropuna determined by triangulation. A considerable amount of geological and physiographical work was accomplished, furnishing evidence of past climatic changes and of a complex history for the coastal terraces, showing that a submergence took place in Tertiary times and that a later erosion is still in progress. Human bones were found near Cuzco buried under 75 ft. of gravel, and the conclusion was arrived at that they were interstratified with this deposit. The object of the expedition was primarily to reconnoitre the region, and other expeditions to follow up the more important discoveries are contemplated.

THE summary of the weather issued by the Meteorological Office for the week ending March 16 shows that for the fifth week in succession the mean temperature was in excess of the average over the entire area of the United Kingdom. The excess was decidedly less than in some of the preceding weeks, although it amounted to 4° in the east of England, and was nowhere less than 2°. The excess of temperature, as almost continuously throughout the past winter, was due to a persistent southerly wind from off the Atlantic. The rains last week were generally less heavy than of late, although the amount was in excess of the average over nearly the entire kingdom. At Greenwich the thermometer in the shade registered 61° on March 14, which is 12° above the average for the season, and is as high as in any previous year on the corresponding day since 1841.

To the Journal of the Meteorological Society of Japan for November last, Prof. T. Okada contributes an article entitled "Geometrical Constructions for Finding the Motion of a Cyclone by Observing the Shift of Wind," in which the law of wind gyration during the passage of a storm is rendered in a more definite form, based upon the following two assumptions, neither of which may be strictly true:—(1) that the angle between the direction of the wind and the gradient is constant in the cyclonic region under consideration; (2) that the cyclonic centre is making a uniform rectilinear motion during the interval of time under consideration. The solutions of the problems which are given for cases when a ship has come to a standstill or is moving are useful and interesting; at the same time, we think that captains of vessels would prefer to adhere strictly to the ordinary rules laid down in their handbooks, which have been carefully drawn up by the Admiralty and others for dealing with storms in all circumstances.

ATTENTION has been directed to a somewhat unfortunate omission in the review by Prof. Bryan of the Bulletin of the Calcutta Mathematical Society (NATURE, February 29, p. 583) which appears to overlook the valuable collections of abstracts published in Europe in the *Jahrbuch über die Fortschritte der Mathematik*, the *Revue semestrielle*, and, we may add, the International Catalogue of Scientific Literature. While regretting this oversight, the reviewer still thinks that an opening exists for a journal published regularly, and at frequent intervals, giving an up-to-date summary of what is happening in the mathematical world in the smallest possible compass, and modelled largely on the journal described. Annuals like the *Jahrbuch* in no way meet this want.

A NEW determination of the atomic weight of radium has been made recently by Dr. O. Hönigschmid, of Vienna, who had at his disposal 1·5 grams of radium chloride, that is, about four times the amount which has previously been available. He purified his salt by fractional crystallisation from dilute nitric acid, the method worked out by Mme. Curie. He took, however, certain precautions not taken by Mme. Curie, both in the purification and in the subsequent analysis by precipitation with silver nitrate. On the basis of 107·88 for silver, he arrives at the result 225·95, with a possible error of 0·02. Dr. Hönigschmid's paper forms No. 7 of the *Mitteilungen aus dem Institut für Radiumforschung*, of Vienna.

WE have received a pamphlet containing an account of a new laboratory for experiments on radio-active substances which has been opened at Gif, Seine-et-Oise, under the direction of M. Jacques Danne, editor of *Le Radium*. The laboratory, which is private in character, has been arranged to provide facilities for commercial and scientific work on radio-active minerals and products, and to provide the necessary apparatus and instruction for those who wish to acquire a practical knowledge of radio-active methods and their application. In addition, it will be available for investigation both in the theoretical and commercial side of radio-activity. The laboratory is conveniently situated in a retired spot about 206 kilometres from Paris, and consists of a number of detached buildings, including a laboratory for chemical and physical work on radio-active substances, another for research and practical instruction, and also a library and administrative offices. Photographs are given of the various buildings and the interior of some of the laboratories, which appear to be well equipped for the work proposed. The laboratory has been designed to supplement the work of university laboratories and radium institutes, and no doubt will prove of value especially in connection with the commercial side of radio-activity. The creation of this laboratory illustrates the increasing technical as well as scientific importance of the rapidly growing subject of radio-activity. All communications are to be addressed to the director of the laboratory at Gif, or at his office, 91 Rue Denfert-Rochereau, Paris.

As the result of their measurement of the expansion of mercury, Prof. Callendar and Mr. Moss in their recent paper before the Royal Society gave the value of the mean coefficient of dilatation between 0° and 100° C. as $182{\cdot}05 \times 10^{-6}$. As this result differs from the value $182{\cdot}54 \times 10^{-6}$ obtained by Dr. Chappuis at the Bureau international des Poids et Mésures, they express the opinion that it is not safe to take the coefficient of cubical expansion of the material of a containing vessel as three times the linear coefficient, which Chappuis had done. In the *Verhandlungen der Deutschen Physikalischen Gesellschaft* for February 15 Drs. Scheel and Heuse, of the Reichsanstalt, show that the results of Chappuis for both water and mercury agree with those obtained at the Reichsanstalt, and they are disposed to think that some error has crept into the measurements of Callendar and Moss. They support this view by reference to Harlow's measurements of the expansion of fused silica. When these are based on the results of Callendar and Moss they differ from, and when based on the older results they agree with, those of other observers.

THE Bausch and Lomb Optical Company has forwarded to us specimens of their new and improved models of microscopes produced at the beginning of the present year. This American firm is well known for first-class work, and its association with the Carl Zeiss optical works at Jena, with which it exchanges ideas and experiments, gives it great opportunities and standing; the various improvements it has effected, together with reduction in prices, will therefore be of interest to all users of the microscope. The type of instrument is Continental rather than British; there is no centring of the substage for bright field illumination, although the dark field is provided for in this respect. We note the presence of provision for oblique illumination, the absence of which generally in our English stands is regretted by some. Messrs. Bausch and Lomb do not catalogue apochromatic objectives, but, as was to be expected, their association with the Jena glass works enables them to produce achromatics of excellent quality, penetration and minimum of colour being their characteristics. It is worthy of note that they obtain these results without using fluorite. Some of the smaller instruments are marvels of cheapness, and great choice of fittings is given. We direct special attention to the mechanical stage provided for fixing to a square stage; it is one of the cheapest and most convenient we have seen, the screws being in close juxtaposition. The pamphlet on the use and care of the microscope issued with each instrument is admirably written and is full of suggestions of value to the beginner.

IN continuation of their well-known experiments on photochemical action, Profs. Ciamician and Silber describe in the *Atti dei Lincei* (vol. xx., p. 673) a number of striking cases of oxidation of aromatic hydrocarbons brought about by sunlight and gaseous oxygen in presence of water. Toluene, the three xylenes, and cymene, when mixed with water and exposed in large flasks or bottles to the action of the gas in bright sunlight during several months, give rise to the corresponding carboxylic acids, toluene forming benzoic acid and the xylenes the corresponding toluic acids; the yield in some cases was as high as 30–40 per cent. of the theoretical quantity. Small quantities of the dicarboxylic acids are also formed in the case of the xylenes, metaxylene, for instance, yielding isophthalic acid. *p*-Cymene gave rise principally to paracumic acid, $C_3H_7.C_6H_4.CO_2H$, but the interesting compound $(CH_3)_2C.(OH).C_6H_4.CO_2H$ was also formed, together with its product of dehydration, $C_3H_5.C_6H_4.CO_2H$. It is noteworthy that *ortho-* and *para-*nitrotoluenes remain unchanged when exposed to the action of moist oxygen under similar conditions, without giving rise to more than traces of acid.

A USEFUL addition is made to our knowledge of the strength of reinforced concrete piles in an article in *Engineering* for March 15. The author, Mr. F. H.

Jeffree, considers the strength of the pile to resist the various handling processes it has to undergo before being finally driven. From the diagrams given, the pile is subjected to a maximum bending moment of $W(L-8)^2/8$ in.-lb., where W is the weight of the pile in lb. per inch run, and L is its length in inches. Expressions are given for the moment of resistance for the pile lying on the flat and also for one diagonal of the section vertical. As reliance is placed on the continuity of the concrete to protect the steel from corrosion, the author proposes to limit the stress on the steel to 20,000 lb. per square inch before driving the pile. Hair cracks in the concrete will thus be avoided. The article closes with a useful table giving the section moduli and limits of safe length for piles from 10 to 16 in. square with various amounts of reinforcement in which the above-mentioned conditions are fulfilled.

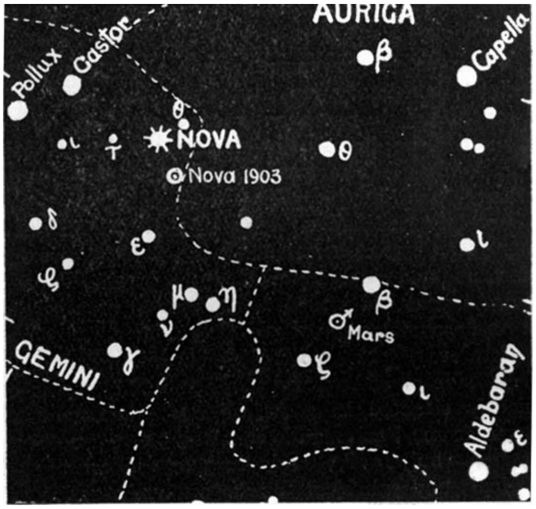
The interest taken in the development of the Diesel engine was evidenced by the very large attendance at the Institution of Mechanical Engineers on Friday, March 15, when a paper was read by Dr. Rudolph Diesel. The author considers that England has the greatest interest in replacing the coal-wasting steam engine by the Diesel engine, as enormous savings can be thus effected in her most valuable treasure—coal. As tar and tar oils are from three to five times better utilised in the Diesel engine than coal in the steam engine, a more economical way of using coal is obtained if, instead of being burnt in boiler furnaces, it is first converted into coke and tar by distillation. Coke is useful for metallurgical and other general heating purposes; from a part of the tar the valuable by-products are first extracted, and undergo further processes in the chemical industry, whilst the tar-oils and combustible by-products, together with a great part of the tar itself, are burned in the Diesel engine under extraordinarily favourable conditions. For river vessels in the colonies, the Diesel engine is very suitable. Questions regarding the limiting dimensions of cylinders, influenced by the strength of the metal and by the heat produced, were raised in the discussion.

A list of the publications of the Carnegie Institution of Washington has been received. Copies of each publication, except the "Index Medicus," are sent gratuitously to a limited list of the greater libraries of the world, while the remainder of the edition is on sale at a price sufficient only to cover the cost of publication and carriage to purchasers. Brief descriptions of the contents of the more important volumes add greatly to the value of the catalogue.

OUR ASTRONOMICAL COLUMN.

Nova Geminorum No. 2.—A second telegram, which arrived from Kiel too late for us to publish the correction last week, announces that Herr Enebo's new star is near θ, not η, Geminorum. The new position, being at a greater altitude, is better for observation than the earlier one, and on March 15 the nova was quite easily found a little to the south and east of θ Geminorum; the accompanying chart shows, approximately, the position, and also that of Nova Geminorum No. 1, discovered photographically by Prof. Turner in 1903.

Greenwich measures made on March 15 give the position as 6h. 49m. 14s., +32° 15′. Photographs of the spectrum show the hydrogen lines, both dark and bright, with other bright lines, and the magnitude was estimated as about 4·0; observations made independently at Chichester and Birmingham show that the star, later on March 15, was fainter than the fourth magnitude. Later observations, by several observers, show that by Monday night the star was certainly fainter than magnitude 5.



We learn from Prof. Fowler that a spectrum secured during a short, clear interval on Friday night, at the Imperial College of Science, shows the spectrum to be similar to those of Novæ Persei and Aurigæ in the earlier stages. Although the dispersion is small, the bright and dark hydrogen series are easily seen.

Observations of Mars.—With the 10-in. refractor of the Urania Observatory, Herren Janssen and Andersen made a number of observations of Mars during the months September to December, 1911. An eosin-red glass was at times employed to accentuate the contrast between the different parts of the planet's surface. While the "coastlines" generally were very well defined, the islands in the "Südmeere" were very pale; the details of the observations are shown on a chart accompanying the paper in No. 4561 of the *Astronomische Nachrichten.* Twenty-nine "canals" were seen, but none was seen doubled.

The Constitution of the Ring Nebula in Lyra.—In a paper recently communicated to the Heidelberg Academy, Prof. Max Wolf finds that certain radiations are emitted only by well-defined portions of the Ring Nebula, the line λ 4686 arising solely from the central dark space, while the line λ 3729 occurs chiefly towards the outer edge of the bright ring; this differentiates these two radiations from the others in the nebular spectrum, and, according to Prof. Wolf, probably denotes different substances with widely differing atomic weights. Dr. Nicholson's failure to account for these two lines in his recent theoretical discussions of the spectrum of the hypothetical substance "nebulium" consequently affords no indication that his theory is untenable.